

Remarks/Arguments

A. Pending Claims

Claims 1727-1756, 1758-1773, 1775-1804, 5396-5402, and 5405-5408 are currently pending. Claims 1727, 1738, 1766, 1777, and 5402 have been amended. Claims 1738 and 1777 have been amended for clarification and/or for correction of typographical errors. Claims 5405-5408 are new. Claims 1757, 1774, 5403, and 5404 have been cancelled.

B. The Claims Are Definite Pursuant To 35 U.S.C. § 112, Second Paragraph

The Examiner rejected claims 1738 and 1777 under 35 U.S.C. § 112, second paragraph, “as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.” The Examiner states: “These claims are unclear regarding the use of the terms ‘part of’, ‘portion of’ and ‘the portion of the part of’.”

Claims 1738 and 1777 have been amended for clarification. Applicant respectfully requests removal of the rejections of claims 1738 and 1777.

C. Provisional Double Patenting Rejection

The Examiner provisionally rejected claims 1756-1759, 1742-1744, 1795-1798, 1781-1783, 5398-5401, 5403, and 5404 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over copending U.S. Patent Application Nos. 09/840,937; 09/841,170; 09/841,288; 09/841,300; 09/841,438; 09/841,441; 09/841,445; 09/841,495; 09/841,638; and 09/841,639. Applicant respectfully requests reconsideration of these provisional rejections in light of the current amendments to the claims.

D. The Claims Are Not Anticipated By Tsai Pursuant To 35 U.S.C. § 102(b)

The Examiner rejected claims 1727, 1729, 1737, 1753, 1760-1762, 1766, 1768, 1776, 1792, and 1799-1801 under 35 U.S.C. 102(b) as anticipated by U.S. Patent No. 4,299,285 to Tsai et al. (hereinafter “Tsai”). Applicant respectfully disagrees with these rejections.

In item 1 on page 13 of the Office Action mailed June 10, 2003, the Examiner states: “Claims 1735, 1756-1759, 1742-1744, 1774, 1795-1798, 1781-1783, 5398-5401, 5403, and 5404 have been identified as including subject matter which is allowable over the prior art.”

Independent claim 1727 has been amended to include features of claim 1757. Independent claim 1766 has been amended to include features of claim 1774. Independent claim 5402 has been amended to include features of claim 5403. Applicant respectfully requests removal of the rejections of claims 1727, 1766, 5402 and the claims dependent thereon.

The standard for “anticipation” is one of fairly strict identity. To anticipate a claim of a patent, a single prior source must contain all the claimed essential elements. *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 231 U.S.P.Q. 81, 91 (Fed. Cir. 1986); *In re Donahue*, 766 F.2d 531, 226 U.S.P.Q. 619, 621 (Fed. Cir. 1985).

The Examiner states: “With regards to claim 1729; the Tsai reference teaches a pyrolysis temperature range within a section of the formation (300° is disclosed on col. 3, line 44).” The Examiner makes a similar statement about claim 1768.

Tsai states:

The pretreatment and conditioning of the swelling coal before the in situ combustion and gasification procedure is initiated involves the injection of heated air into the injection hole at sufficient pressure to fracture the coal, and the injection of the heated air through the fracture to the production hole without combustion of the coal. (Tsai, column 3, lines 21-27)

Tsai also states:

In general, we prefer that the temperature of the heated air be a maximum of about 350° C. and most prefer that the maximum temperature be about 300° C. The range of about 150° C to about 300° C. is a particularly suitable operating range. (Tsai, column 3, lines 41-45)

Claims 1729 and 1768 describe a combination of features including: “maintaining a temperature in the part of the formation in a pyrolysis temperature range from about 270 °C to about 400 °C.” Tsai appears to teach a temperature of heated air. Tsai does not appear to teach or suggest maintaining a temperature in the part of the formation in a pyrolysis temperature range from about 270 °C to about 400 °C. Applicant respectfully requests removal of the rejections of claims 1729 and 1768.

The Examiner states: “With regards to claims 1760, 1798, and 1799 and 1761; Tsai teaches combustion of the coal. Since most of the coal would be burned, the permeability would inherently increase to greater than 250 md in at least ‘a part’ of the formation.” Applicant disagrees that most of the coal would be burned and that the permeability would inherently increase to greater than 250 md.

Tsai states: “The effect of hot nitrogen as a treating gas was also evaluated. The data and analyses are set out in Table I.” (Tsai, column 6, lines 57-59) In Table I, Tsai shows an initial permeability of coal of 2-11 md and a maximum permeability of 148 md after treatment.

Claims 1760 and 1799 describe a combination of features including: “allowing the heat to transfer increases a permeability of a majority of the part of the formation to greater than about 250 millidarcy.” Applicant submits that Tsai does not teach or suggest allowing heat to transfer to increase a permeability of a majority of the part of the formation to greater than about 250 millidarcy. Applicant respectfully requests removal of the rejections of claims 1760 and 1799.

Tsai states:

Once hot air injection is initiated under increasing pressure, the fracturing of the coal seam to obtain the well-to-well linkage will result after the critical pressure is reached. (Tsai, column 3, lines 46-49)

Tsai also states:

In our process, the coal proximate to the fracture induced channels or links, that is, the coal forming the surface of the channels and broadly extending from the surface up to about 20 inches (50.8 cm) in thickness, more generally from about one (2.54 cm) to about six inches (15.4 cm) in thickness from the channel walls, is pretreated and preconditioned by our hot air process to obtain the desired decrease in swellability and the desired increase in coal permeability. (Tsai, column 4, lines 27-35)

Claims 1761 and 1800 describe a combination of features including: “allowing the heat to transfer increases a permeability of a majority of the part of the formation such that the permeability of the majority of the part is substantially uniform.” Tsai appears to teach a fractured coal seam. Tsai does not appear to teach or suggest that a permeability of the majority of the part of the formation is substantially uniform. Applicant respectfully requests removal of the rejections of claims 1761 and 1800.

The Examiner states: “With regards to claim 1762, although the Tsai reference fails to explicitly disclose a Fischer Assay; it is apparent that the disclosed process will yield greater than 60%.” The Examiner makes a similar statement about claim 1801.

Tsai states:

When combustion is initiated in the coal seam at the injection hole to initiate the gasification procedure, a series of oxidation and reduction reactions occur, which are not thoroughly understood. The net result is a combustible product gas comprising carbon monoxide, hydrogen and some methane as its principal combustibles and having a heat content which depends on many factors including whether supplemental oxygen and/or water are added to the oxidizing gas. Once the coal proximate to the channels or links has been adequately conditioned, as described herein, plugging will not occur during the combustion and gasification. As the fire progresses in the coal seam, the coal

not proximate to the original channels, which had not been affected by the hot air pretreatment, will successfully burn without plugging the gas channels because the conditions which permitted plugging to occur are not longer present. (Tsai, column 5, line 52 – column 6, line 9)

Claims 1762 and 1801 describe a combination of features including: “controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by the Fischer Assay.” Tsai appears to teach a fire in the coal seam. Tsai does not appear to teach or suggest controlling the heat. Tsai also appears to teach producing a combustible product gas comprising carbon monoxide, hydrogen, and some methane. Tsai does not appear to teach or suggest a yield of greater than about 60% by weight of condensable hydrocarbons, as measured by Fischer Assay. Applicant respectfully requests removal of the rejections of claims 1762 and 1801.

E. The Claims Are Not Anticipated By Terry Pursuant To 35 U.S.C. § 102(b)

The Examiner rejected claims 1727, 1733, 1766, 1772, and 5402 under 35 U.S.C. 102(b) as anticipated by U.S. Patent No. 4,010,800 to Terry (hereinafter “Terry”). Applicant respectfully disagrees with these rejections.

Independent claims 1727 and 1766 have been amended to include features of claims 1757 and 1774, respectively. Independent claim 5402 has been amended to include the features of claim 5403. Applicant respectfully requests removal of the rejections of claims 1756, 1774, 5402 and the claims dependent thereon.

F. The Claims Are Not Obvious Over Tsai Pursuant To 35 U.S.C. § 103(a)

The Examiner rejected claims 1728, 1730, 1731, 1738-1750, 1754, 1755, 1767, 1769, 1770, 1777-1789, 1793, and 1794 under 35 U.S.C. 103(a) as obvious over Tsai. Applicant respectfully disagrees with these rejections.

In order to reject a claim as obvious, the Examiner has the burden of establishing a *prima facie* case of obviousness. *In re Warner et al.*, 379 F.2d 1011, 154 U.S.P.Q. 173, 177-178 (C.C.P.A. 1967). To establish a *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974), MPEP § 2143.03.

The Examiner states:

With regards to claims 1728 and 1767; the Tsai reference fails to explicitly teach the superposition of heat sources. It is apparent that one of ordinary skill in the art would know that the heat sources should be spaced to substantially heat the entire formation. Any configuration of heat sources that Provides heat to the entire formation would inherently cause superposition of heat; thus it would have been obvious to one of ordinary skill in the art at the time of the invention to have further modified the Tsai method to have included superposition of heat as called for in claims 1728 and 1767; in order to ensure that the entire formation is heated.

Tsai states:

More particularly, this invention relates to a process carried out prior to the combustion and gasification procedure comprising the injection of heated air into the coal bed at sufficient pressure to fracture the coal and provide a link between the injection and production wells. Continued injection of the hot air, heated below the softening temperature of the coal, pretreats and conditions the coal proximate to the fracture thereby increasing the permeability of this coal as evidenced by enhanced well-to-well air flow and greater oxygen accessibility of the coal in the subsequent combustion and gasification procedure. (Tsai, column 1, lines 10-22)

Claims 1728 and 1767 describe a combination of features including: “wherein superposition of heat from at least the two heaters pyrolyzes at least some hydrocarbons in the part of the formation.” Tsai appears to teach fracturing coal and heating along the fracture. Applicant submits that the heating process of Tsai would not necessarily allow superposition of heat from at least two heaters to pyrolyze at least some hydrocarbons in the part of the formation. Applicant respectfully requests removal of the rejections of claims 1728 and 1767.

The Examiner states: "With regards to claims 1730 and 1769, electrical heaters are well known to heat air. It would have been obvious to one of ordinary skill in the art at the time of the invention to have used an electrical heater with the Tsai process as called for in claims 1730 and 1769, in order to heat the air."

Tsai states:

The pretreatment and conditioning of the swelling coal before the in situ combustion and gasification procedure is initiated involves the injection of heated air into the injection hole at sufficient pressure to fracture the coal, and the injection of the heated air through the fracture to the production hole without combustion of the coal. (Tsai, column 3, lines 21-27)

Claims 1730 and 1769 describe a combination of features including: "wherein at least one of the one or more heaters comprises an electrical heater." Claims 1727 and 1766 upon which claims 1730 and 1769 depend describe a combination of features including: "providing heat from one or more heaters positioned in heater wells to at least a section of the formation." Tsai appears to teach injecting heated air into the formation. Tsai does not appear to teach or suggest an electrical heater positioned in a heater well. Applicant respectfully requests removal of the rejections of claims 1730 and 1769.

The Examiner states:

With regards to claims 1739-1741, 1745-1750, 1754, 1755, 1778-1780, 1784-1789, 1793, and 1794; the nature of hydrocarbons produced from such heating is highly variable, and dependent upon many factors, not least of which is the characteristics of the coal. The components of the produced mixture are deemed to be the results of design variables, including coal characteristics and temperature.

Applicant submits that the product mixtures recited in claims 1739-1741, 1745-1750, 1754, 1755, 1778-1780, 1784-1789, 1793, and 1794 may be produced by controlling and/or modifying formation conditions during treatment to produce the selected results recited in the

claims. The product mixtures would not necessarily be produced by carrying out the heating process of Tsai. Furthermore, Tsai does not appear to teach or suggest the product mixtures described in claims 1739-1741, 1745-1750, 1754, 1755, 1778-1780, 1784-1789, 1793, and 1794. Applicant respectfully requests removal of the rejections of claims 1739-1741, 1745-1750, 1754, 1755, 1778-1780, 1784-1789, 1793, and 1794.

G. The Claims Are Not Obvious Over Tsai In View of Kasevich Pursuant To 35 U.S.C. 103(a)

The Examiner rejected claims 1736 and 1775 under 35 U.S.C. 103(a) as obvious over Tsai in view of U.S. Patent No. 4,457,365 to Kasevich et al. (hereinafter “Kasevich”). Applicant respectfully disagrees with these rejections.

The Examiner states:

The Tsai reference fails to teach the heating rate. With regards to claims 1736 and 1775; it is known to heat at rates of less than 10°C per day, as shown by Kasevich (figure 3). It is apparent that this low heating rate is desirable because it results in more uniform heating, and reduces the possibility of hot spots. It would have been obvious to one of ordinary skill in the art at the time of the invention to have further modified the Tsai method to have included heating at a rate of less than about 10°C per day as called for in claims 1736 and 1775, in order to achieve more uniform heating.

Kasevich states:

Thus, if the kerogen were heated from 150° C. to 500° C. at the rate of 50° C./month, the absorption rate would approximate that of curve 114, while more rapid heating rates would produce curves 120, 122 and 124 for heating rates of 50° C./day, 50° C./hour and 50° /minute, respectively. These curves, which are for a small region of an oil shale formation and are by way of illustration only, and different oil shale bodies will exhibit different characteristics producing different curves. (Kasevich, column 8, lines 57-66)

Claims 1736 and 1775 each describe combinations of features including: “wherein heating energy/day (*Pwr*) provided to the selected volume is equal to or less than $h*V*C_v*\rho_B$, wherein ρ_B is formation bulk density, and wherein an average heating rate (*h*) of the selected volume is about 10 °C/day.” Kasevich does not appear to teach or suggest providing heating energy/day (*Pwr*) wherein an average heating rate used to determine the *Pwr* is about 10 °C/day. Applicant respectfully requests removal of the rejections of claims 1736 and 1775.

H. Additional Comments

Applicant believes that no fees are due in association with the submission of this document. If any extension of time is required, Applicant hereby requests the appropriate extension of time. If any fees are required, please charge those fees to Meyertons, Hood, Kivlin, Kowert & Goetzel, P.C. Deposit Account Number 50-1505/5659-03800/EBM.

Respectfully submitted,

Eric B. Meyertons
Reg. No. 34,876

Attorney for Applicant

MEYERTONS, HOOD, KIVLIN, KOWERT & GOETZEL, P.C.
P.O. Box 398
Austin, TX 78767-0398
(512) 853-8800 (voice)
(512) 853-8801 (facsimile)

Date: 9-10-08